(54) Open architecture video pipe system.

(57) A display system architecture is disclosed. The architecture contains at least one bus (10,12,14) for passing of signals for the display, such as audio signals, video signals or system control signals. The bus is traversed across its width by a number of slots (16,18,20,22) that are capable of being connected with separate boards for communication between the boards and the bus. The boards are designed to handle data and functions of the system, whether it is operable as a television, a computer, a computer monitor, or all of the preceding.
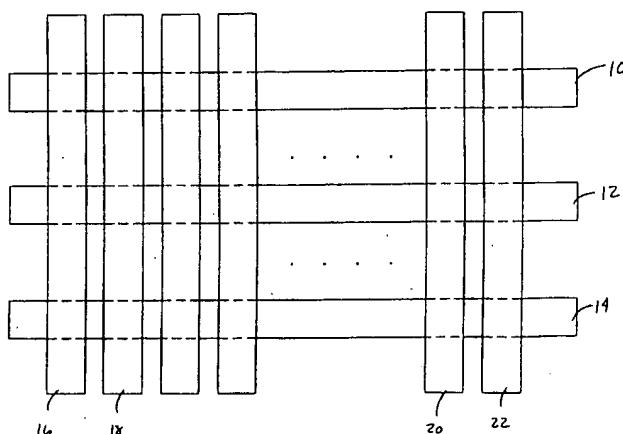
FIGURE 1

encoding scheme used. Finally, the control bus could be 8 bits although a 4- or 16-bit bus would be just as appropriate, depending upon the bus controller. Edge connector 16 is designated as connection 1, 18 is connection 2, and edge connector 20 is connection N. Connector 22 is connection N + 1. Additionally, the functions could all be included in one bus structure.

Figure 2 shows an empty architecture receiver. The bus structure has been integrated with a television receiving circuit, and a video circuit card to drive the display. The television signal comes into the system via antenna 24, is passed to a tuner 26 which in turn sends the signal to video formatter 30 along bus 28. The video formatter has a analog-to-digital converter 32 attached, which converts the incoming signal to be placed on the busses. The digitized signal is sent to the busses via lines 34, into slot 16 which will contain a card. Alternatively, all of the preceding functions could be contained on the card itself, or contained on the motherboard itself, and connected directly to the bus through traces on the board. The card in slot 16 would have circuitry upon it to divide the incoming signal up into a control signal, an audio signal, and a video signal in this example.

At the other end of the receiver, connected to slot 22, is the circuitry to control the output of the display. Bus 38 connects to the connector in slot 22, and communicates the output to the driver 36. Driver 36 has a digital-to-analog converter attached which converts the data necessary to drive the cathode ray tube. If a digital display, such as a deformable mirror device television were to be used, the digital-to-analog converter could be eliminated. In this case, no bus switching circuitry need be provided. The tuner and video card could be hard configured to send and receive on the same partition of the video bus.

Figure 3 shows one of many possible configurations of a fully populated receiver. In addition to the cards already mentioned, other possibilities are: a memory processor 52, with remote input block 54, in slot 18. In slot 56, a remote input and output module 61, with input line 60. The image processor 64 for the display could be in slot 62. Storage controller 68, which could control an external tape drive, is shown in slot 66. A special effects card 72, for controlling such things as windowed screens, slow motion, etc., is in slot 70. Slot 76 holds the controller card for the hard copy output device 78, such as a printer, from the computer. Slot 80 contains a card for controlling an optional display module 82. Audio control of the system is on the card in slot 20, which controls the audio driver 84, with its input 86.

These slots could be placed inside the chassis, much like current personal computer practice, or inside the chassis but easily accessible like current video game practice, or totally open on the enclosure surface. These different physical architectures allow hardware/electrical control architectures to serve different markets.

The overall population of the chassis can be effected in a cartridge format, not unlike home video games. There are many different scenarios. One is that the consumer decides in the electronics store what extras he or she wants. The salesman then populates the slots with the appropriate cartridges, which contain the controllers mentioned above. Some consumers may decide to just buy the chassis, and populate the slots themselves. This system also lends itself to upgrades very easily.

The assignments of slots is completely arbitrary. Likewise, the assignments of bus partitions could also be done in many ways. The partitions could be preassigned and labelled, so when the consumer decides to upgrade, he or she merely buys the cartridge and switch selects it to the appropriate partitions. With a little more complex controllers, the partitions could be universal. The cards would have an identifier in their hardware that allowed them to know which partition on the bus is for them. Additionally, the cards could have some type of acknowledger in them to let the system control card, or the tuner card, know what partition they are on. Partition switching or selecting on each card could be hardwired by jumper, for the lowest cost, local switch selectable, for medium cost, or remotely switch selectable at highest cost. Any external connectors could be mounted on the end of the cartridge away from the end connector, or alternately in a panel or door, such that when the panel or door was closed, the connectors made the appropriate contact through the door. All methods are mutually compatible and can be used simultaneously in the same system, and no method requires expensive bus demultiplexing circuitry since each card uses a dedicated portion of the bus.

The advantages of such a system are numerous. Some of these are modularity, expandability, and portability. A modular television/monitor console is easier to upgrade and to repair. When a standard for HDTV is finally decided, if it requires a change in the tuner, or a change in the display, just the tuner card, or the display needs to be changed. If the display is spatial light modulator driven, with binary inputs, it may be that the controller for the display be changed, not the entire CRT module. When HDTV becomes a reality, a new controller, or whatever is required to allow the upgrade will be easier to install. This system is portable between television and video graphics. It can be used now, and in the future.
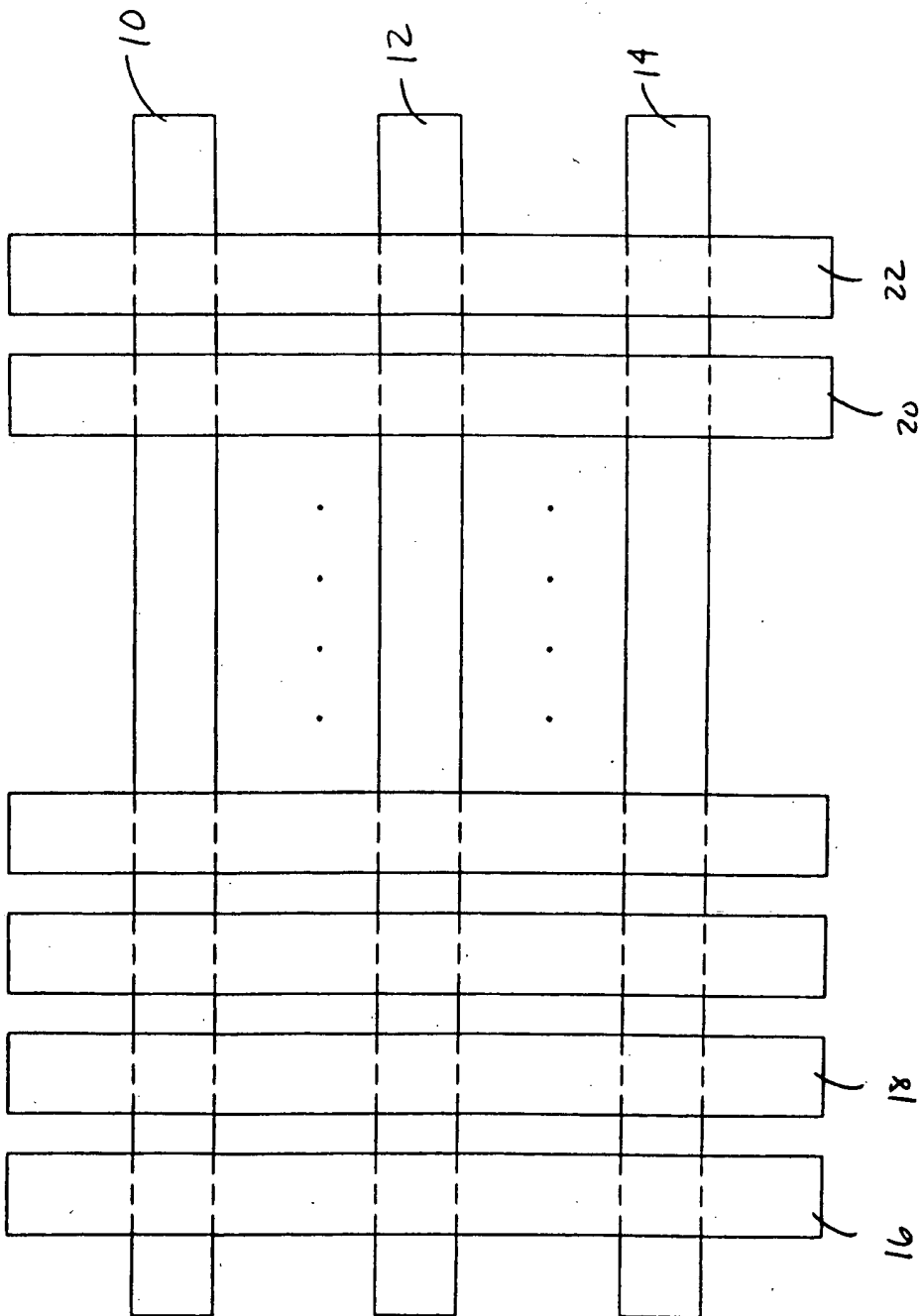
FIGURE 1

FIGURE 3